COURSE DESCRIPTION CARD - SYLLABUS

Course name

Computer aided design for Electrical Power Engineering

Course

Field of study	Year/Semester
Electrical Engineering	2/3
Area of study (specialization)	Profile of study
-	general academic
Level of study	Course offered in
Second-cycle studies	polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
10	10	
Tutorials	Projects/seminars	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge in the field of electrical engineering and computer skills. The ability to effectively self-study in a field related to the chosen field of study. Is able to operate a computer at a basic level. Student is aware of the need to expand their competences. Understands the need to use computer programs at work.

Course objective

Understanding the application of computer methods in the design of power systems and networks. The use of computer technology in the control of power processes. Introduction to computer-assisted decision support methods and design in power plants and the power system. Formulation of mathematical models describing the properties of energy installations and their elements. Modeling of physical phenomena occurring in insulation systems under the influence of high voltage. Solving simple optimization problems.

Course-related learning outcomes

Knowledge

1. Student has knowledge of the methodology and principles of automatic design of modern power supply for power facilities.

2. Student has knowledge in the field of decision support and design in power plants and the power system.

3. Student hasknowledge of modeling processes in computer memory of physical processes.

Skills

1. Student is able to design the power structure of the power facility, work system in normal and emergency conditions, make a detailed selection of system power supply components, reactive power compensation and its protection. He can make the final technical documentation in European standards.

2. Student is able to apply decision support and design tools in power plants and elements of the power system.

3. Student can model physical phenomena occurring in insulation systems.

Social competences

1. Student is aware of the need to use modern decision support methods and design to achieve a high quality technical solution.

2. Student understands the need to obtain economic and social acceptability for the chosen technical solution.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- assessment of knowledge and skills demonstrated on the final, written or oral test,

Laboratory classes

- continuous assessment during each class (rewarding activity and quality of perception).

- evaluation of laboratory projects made individually by each student.

Programme content

Lecture

Computer network calculation systems and design support. Calculations of power flows and voltage levels. Calculation of short circuits in the network. Methodology of designing power supply for power facilities. Analysis of measurement data in the Matlab / Simulink environment. Power block as a regulation object. Control systems for the operation of the power block and simulation of the thermal power plant operation.

Laboratory classes

- data management in the Matlab / Simulink environment

- calculation of energy yield from renewable energy sources

- use of neural networks to identify transformer paper insulation defects

Teaching methods

Lecture

Lecture with multimedia presentation supplemented with examples given on the board.

Laboratory classes

Laboratory exercises performed with the help of engineering programs.

Bibliography

Basic

1. Kulczycki J., Optymalizacja struktur sieci elektroenergetycznych, WNT, Warszawa, 1990 r.

2. Kujszczyk Sz.: Nowoczesne metody obliczeń elektroenergetycznych sieci rozdzielczych. WNT, Warszawa, 1984 r.

3. Pawlik M. Układy i urządzenia potrzeb własnych elektrowni. WNT. 1986.

4. Rakowski J. Automatyka cieplnych urządzeń siłowni. WNT. 1976.

5. Janiczek R. Eksploatacja elektrowni parowych. WNT. 1992.

Additional

1. Planning of Power Distribution - the manual for Totally Integrated Power, Siemens AG, Erlangen, 2001.

2. Marszałkiewicz K., Trzeciak A.: Nowa wersja systemu Simaris deSign. Elektrosystemy, Warszawa, czerwiec 2005, 6 - ISSN 1509-2100 ss. 114-121.

3. http://www.automation.siemens.com/_en/simaris

4. Bartosz Ceran, Paul A. Bernstein: Application PEM fuel cells in virtual power plant. Computer Applications in Electrical Engineering, Rocznik: 2014 | Tom: vol. 12

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	35	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)[1]	25	1,0

[1] delete or add other activities as appropriate